



PJM Interconnection
Valley Forge Corporate Center
955 Jefferson Avenue
Norristown, PA 19403-2497

Robert V. Eckenrod
Senior Counsel
610.666.3184 | fax 610.666.8211
eckenr@pjm.com

July 9, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE.
Washington, D.C. 20426-0001

Re: *PJM Interconnection, L.L.C.*; ER13-1911-000

Pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, and Section 35.13 of the regulations of the Federal Energy Regulatory Commission (“FERC” or the “Commission”), 18 C.F.R. Part 35, PJM Interconnection, L.L.C. (“PJM”) hereby submits for filing revised sheets of the Open Access Transmission Tariff (“Tariff”).¹ The purpose of the proposed revisions are to incorporate changes to Schedule 6A of the Tariff to implement enhancements made to PJM’s black start procurement and system restoration planning, and alter PJM’s black start cost allocation to support the provision of cross-zonal black start support. PJM respectfully requests that the Commission accept the proposed revisions for filing, allowing them to become effective on September 9, 2013.

I. Background

Schedule 6A of PJM’s Tariff sets forth the details necessary for identifying generators to provide black start service² that are included in restoration plans and are critical for restoration of the Transmission System in the event of a de-energizing event. Importantly, not only do the provisions of Schedule 6A establish the basic performance and testing criteria for identified Black Start Units, but it also sets the annual black start service revenue requirements for the PJM Region and establishes the appropriate cost recovery for black start service providers. In turn, Transmission Customers are charged, and pay, for black start service in accordance with the allocation methodologies set forth further in Schedule 6A.

¹ Capitalized terms not otherwise defined herein have the meaning specified in the PJM Operating Agreement or the PJM Open Access Transmission Tariff, as appropriate.

² Black start service represents the capability of generating units to start without an external (system) electrical supply or possess the demonstrated ability to automatically remain operating at reduced levels when disconnected from the electrical grid. See, *PJM Tariff Schedule 6A* ¶ 2.

Because the provision of black start service and its associated revenue requirements are rooted in the concept that generators are inclined to provide needed black start service on a more consistent basis when they are given the opportunity to recover their capital investment and operating costs associated with providing black start service, plus some sort of “incentive” return on that investment, over the last several years, PJM and its stakeholders have incrementally attempted to align black start cost recovery more closely with the actual costs incurred by a Black Start Unit owner. To this end, early in 2009, PJM submitted revisions to Schedule 6A of PJM’s Tariff which were designed to allow black start service providers the ability to recovery incremental capital costs necessary to provide black start service³, and later, in 2011, PJM submitted further revisions to the cost recovery mechanisms set forth in Schedule 6A to provide further, alternative opportunities for black start service providers to recover their capital costs⁴.

Consistently, the goal of these cost recovery mechanisms has been to encourage existing and new generation to provide necessary black start service. While those changes have helped PJM maintain a consistent level of black start support, in recent years a variety of industry developments – including the development of mandatory Reliability Standards, as well as increased Federal and State regulations - has met head on with those cost recovery improvements and, consequently, PJM has identified that there may be potential impacts to the availability of viable black start generation in the future which, in turn, could impact PJM’s system restoration planning. To be clear, there are no reliability concerns identified in the current system restoration process or plan. However, as an example of the type of issues that may affect black start availability, PJM has identified that approximately 42% of the capacity of the existing fleet of black start generation may be impacted by environmental regulations in the ensuing years.

With this in mind, in January, 2012, PJM’s Markets and Reliability Committee (“MRC”) chartered the System Restoration Strategy Task Force (“SRSTF”) which was charged with evaluating PJM’s current system restoration planning process to determine its continued viability and efficiency in light of those industry developments, and recommend, if necessary, changes to the system restoration strategy and associated procurement and cost allocation methodologies.⁵ The SRSTF convened and immediately considered whether the current system restoration planning process would be sufficient given the challenges presented by current and future regulatory requirements. Currently, system restoration plans and black start requirements are developed on a Transmission Owner (“TO”) zonal basis, which means that, historically, PJM has obtained, and designated black start resources for each specific transmission zone, which limits the selection of black start resources to the transmission zone requiring the black start service. Moreover, the current planning process includes several design components relating to restoration timing, redundancy, performance criteria and critical load definition which may be

³ See, *PJM Interconnection, L.L.C.*, Docket No. ER09-730-000 (February 19, 2009).

⁴ See, *PJM Interconnection, L.L.C.*, Docket No. ER11-4402-000 (August 30, 2011).

⁵ Recently, the System Restoration Strategy Task Force’s charter has been expanded to include consideration of compensation methodologies as well in reviewing PJM’s system restoration planning process. While this filing is intended to implement stakeholder-approved changes related to the procurement of viable black start resources, PJM anticipates that it will be addressing black start compensation methodologies in a future submittal.

more limiting than necessary, thereby excluding the consideration of otherwise viable black start resources.

After reviewing PJM's current system restoration planning process, and applicable rules, against the known, and anticipated, industry developments, the SRTSF determined that the system restoration planning process should be amended to include new strategies for black start service procurement so as to maximize the availability of black start resources in the PJM Region, while, at the same time, enhancing black start capability. Over the course of several months, the SRSTF considered alternative proposals and, ultimately, reached consensus on a proposal that included several design component revisions to PJM system restoration planning process. Some of the more significant proposals recommended by the SRSTF to stakeholders include:

- a. Elimination of a "one size fits all" target restoration time and replacing it with a systematic assessment of restoration time estimates based upon the needs of the system following a blackout event. The new approach would allow PJM and its Transmission Owners to establish restoration target times based upon known and measurable events during a blackout event.
- b. Increased redundancy in black start generation – which can be accomplished through:
(i) including additional margin (10%) to the calculation of Critical Load, in turn resulting in a higher amount of black start capability than would otherwise be required for Critical Load, and; (ii) requiring a minimum of two black start resources be allocated to each transmission zone with a Critical Load requirement.
- c. Cross-zonal coordination – as mentioned above, current system restoration plans were designed, and black start resource procurement were traditionally acquired, on a TO zonal basis. The SRSTF recommended that it would be advisable to identify areas where coordination of TO restoration plans would be beneficial which could include, where feasible, the ability to acquire black start resources from outside the TO zone to meet TO requirements.
- d. Clarification of PJM's responsibility for selecting black start resources and creating a system-wide restoration plan consistent with its role as the NERC-registered Transmission Operator ("TOP")⁶.
- e. Revising the current 90-minute minimum start time for black start resources to a three hour or less start time requirement. This amendment recognizes the changing generation landscape and allow for the potential to recognize more black start

⁶ While PJM would primarily be responsible for procuring black start resources to implement its system restoration plan as established in Schedule 6A, TOs would still retain the ability to procure additional black start resources through bilateral contracts with resource owners. To be included in PJM's system-wide restoration plan, those resource would need to meet the specified performance criteria, but, in all cases, those black start resources procured on a bilateral basis would be compensated outside of the revenue recovery provisions of Schedule 6A.

resources in the system restoration planning. It is projected that this change alone will allow up to an additional 64,000 MW of resources to potentially supply black start in the PJM Region.

- f. Re-definition of “Critical Load” to amend one of the components to include cranking power to all units with a hot start time of four hours or less, instead of the previously defined steam units with a hot start time of eight hours or less. This change allows for the use of cranking power to any unit that can start in four hours or less – currently estimated to be approximately an additional 70,000 MW of capacity – which will provide significant generation capacity that can be utilized during the early stages of system restoration. Once this “four hour” generation is online, it can be used to supply cranking power to units with longer than four hour starting times.
- g. RTO-wide five-year black start procurement process – rather than relying upon an *ad hoc* procurement process, the SRSTF recommended that PJM employ a five-year selection process for the procurement of black start resources. Under this proposal, PJM would issue a system-wide Request for Proposal (RFP) for black start resources every five years, and rely upon incremental RFPs in the interim to replace retiring or terminated black start resources.
- h. Elimination of the business rule limiting the number of black start units at any one site – PJM’s business rules had limited the number of eligible black start resources at any one generating site to three resources. This proposal removes that limitation.

In many instances, the recommendations proposed by the SRSTF could be, and were, implemented by amendments to PJM’s existing business rules and/or Manuals after stakeholder review and approval. Others recommendations, such as the ability to rely upon cross-zonal support for the procurement of black start resources, and re-definition of certain performance criteria, require revision to Schedule 6A of PJM’s Tariff. As such, appropriate revisions have been offered her to complete the implementation of the initial phase in revamping PJM’s system restoration planning process.

II. The Proposed Revisions

A. Clarification of PJM’s Responsibility for Selecting Black Start Resources and Developing a System Restoration Plan

In several sections of Schedule 6A, the responsibility for procuring black start resources and creating a system restoration plan would appear to be a shared task with Transmission Owners. As discussed above, the SRSTF recommended, and stakeholders agreed, further clarification of PJM’s responsibility for selecting black start resources and creating a system-wide restoration plan is consistent with its role as the NERC-registered TOP and should be considered where possible. Accordingly, PJM offers changes to the preamble to Schedule 6A and paragraphs 4, 5, 6, 7(a), 25 and 26 to clarify that PJM (*i.e.* the Transmission Provider) has the sole responsibility for designating black start resources and for developing a coordinated system restoration plan.

Importantly, however, despite this change, TOs have been, and will still remain, an integral part of the process and PJM will work closely with its TOs to assist in identifying viable black start resources and the amount or number required to support system restoration. In the event of a dispute regarding the location, amount or number of black start resources, or disagreement regarding specific cross-zonal black start support, PJM has specified in its business rules that such disputes will be ultimately be subject to PJM's Dispute Resolution Process (after an attempt to broker such disagreement through PJM's System Operations Subcommittee – Transmission) as set forth in Schedule 5 of PJM's Amended and Restated Operating Agreement ("Operating Agreement").

B. Elimination of 90-minute Minimum Start Time

Another limiting factor in the selection of black start units which exists in the current rules is the requirement that a Black Start Unit must be able to close its output circuit to a dead (*i.e.*, de-energized) bus within 90 minutes of a request from a Transmission Owner or PJM. As noted previously, amending this performance criterion to allow for a general three hour start time could potentially allow for the inclusion of approximately an additional 64,000 MW of black start capability in the system restoration plan, without experiencing degradation in the efficiency of the restoration plan as a whole.

To eliminate this constraint, and potentially broaden the pool of available black start capability, PJM proposes to remove this performance criterion from paragraph 7 of Schedule 6 and, instead, specify a three hour minimum start time in its Manuals and business rules. While this three hour criterion would be the general rule, PJM would reserve the ability to require some black start resources to adhere to less than a three hour start time given critical load restoration timing requirements⁷. By the same token, PJM would propose to allow units with greater than three hour start times on an exception basis only.

As noted, eliminating this performance criterion potentially allows PJM to consider significant additional black start resources when developing its system restoration plan and removing the requirement from the Tariff allows PJM greater flexibility to specify minimum start times that take into consideration actual system requirements rather than relying upon a general, strict rule. Importantly, moving to this new requirement will not degrade the efficiency of PJM's system restoration plan and, in fact, will help to enhance it by allowing it become more dynamic given the potential inclusion of varied black start resources. In conjunction with this change the definition of "Critical Load" was revised to include all units with a hot start time of 4 hours or less. The previous definition of "Critical Load" only included steam units with a hot start time of 8 hours or less. This will allow for more generation to be available earlier in the restoration process which should help facilitate the overall efficient restoration of load.

⁷ PJM recognizes that resources with three hour start times may not be appropriate to meet some nuclear power off-site-safe-shutdown load restoration requirements and, as such, it will retain the four hour time target for restoration of off-site power to nuclear stations.

Finally, PJM has established performance capabilities in its Manuals for Black Start Units. A clarification has been proposed to paragraph 7 to explicitly mandate that Black Start Units must additionally adhere to those performance capabilities, in addition to those set forth in the Tariff.

C. Allowing More Than Three Black Start Units at One Site

Similarly, paragraph 4 of Schedule 6A sets forth a limitation on the number of Black Start Units at a Black Start Plant that are eligible for compensation and inclusion in the system restoration plan. Initially, this business rule was implemented to ensure not only diversity in black start resources, but also to limit the amount of compensation due to any one black start unit owner and allow other unit owners the opportunity to participate in providing black start capability. However, experience has shown that this limitation is unnecessary and, in fact, limits the ability of PJM to consider viable black resources and, as a result, the SRSTF recommended, and PJM stakeholders agreed, that it should be eliminated altogether. Removal of this business rule will allow PJM to consider those additional viable resources that would otherwise not be available, other than on an exception basis, and increase its available black start capability.

D. Cross-zonal Coordination

Recognizing that some TO zonal areas have more black start capability than others, PJM stakeholders approved the recommendation of the SRSTF to allow for inter-TO zonal black start coordination, procurement and support. In this way, PJM can work with TOs to identify areas in the PJM Region where it would be beneficial to coordinate system restoration on a cross-zonal basis based upon such evaluation criteria as assessing reliability requirements, technical feasibility and complexity considerations.

Essentially, cross-zonal black start coordination would be possible in several different scenarios to assist in addressing black start resource shortages, improve restoration timing or efficiency or reducing black start cost. The first would allow a black start unit located outside of a particular TO zone to provide black start service to meet that TO critical load requirements. In a second scenario, PJM, in collaboration with TOs, could identify opportunities to supply critical load and/or customer load pockets across TO zones. In this case, a designated black start resource could serve critical load in multiple TO zones. And, finally, in collaboration with TOs, PJM could identify opportunities to fully aggregate TO zonal restoration with other TO zones (*e.g.* by merging 2 or more existing TO zones for restoration purposes).

The bulk of these rule changes will occur in PJM's business rules and Manuals, however, revisions are required to paragraphs 25, 26 and 27 of Schedule 6A to account for the allocation of zonal rates and revenue requirements for Black Start Units providing cross-zonal support. In particular, zonal rates will be based on the black start capability, or share, of generation units and allocated to network service customers and point-to-point reservations and revenue requirements for Black Start Units will be allocated to the receiving TO zone. For those Black Start Units that are shared and designated to serve multiple zones, their annual revenues will be allocated by TO designated critical load percentage. In this way, zonal rates and revenue requirements will be allocated to the TO zone that is receiving the benefit of the black start service.

E. Corrections and Clarifying Changes

The remaining proposed revisions to Schedule 6A encompass corrective changes necessary to clarify existing rules or procedures. For example, in paragraph 5, PJM has proposed to clarify that a Black Start Unit providing a two-year rolling commitment, and not electing to recover new or additional black start capital costs, may still be terminated involuntarily for failing to successfully pass its annual black start test. In practice, PJM has always applied this rule to those types of units, but because paragraph 6 explicitly applies the rule to Black Start Units recovering new or additional black start capital costs, a parallel provision should be added to paragraph 5 so as to avoid any confusion.

Also, in 2011, PJM proposed, and the Commission accepted, a secondary, capital improvement-based (*i.e.* component based) Capital Recovery Factor (“CFR”) table in paragraph 18 of Schedule 6A, that could be applied, at the election of the Black Start Unit owner, in lieu of the unit-based CRF table set forth in the same section when calculating its applicable revenue requirements.⁸ The CRF tables set forth in paragraph 18 define the applicable commitment period and levelized cost recovery for Black Start Units electing to recover new or additional capital cost. The addition of the component-based CRF table in 2011 allowed the Black Start Unit owner to make, and recoup, relatively minor capital improvements in exchange for an applicable commitment period that would allow the unit to recover its investment over a time based upon the life of the improvement itself, rather than based upon the life of the unit. It was recently recognized, however, that the component-based CRF table included with the 2011 revisions failed to include the applicable recovery period and term of commitment timeframes. A corrective change has been made to paragraph 18 to include those timeframes and revisions made to clarify that the Applicable Recovery Period and the term of Black Start Service commitment shall be the same and be determined by the expected Capital Improvement Lifespan.

Finally, under paragraph 20 of Schedule 6A, PJM must notify its Members when a Black Start Unit seeks to recover new or additional Black Start NERC-CIP Capital Costs under paragraph 18 no later than thirty days prior to the effective date of the recovery. Initially, paragraph 20 allowed any PJM Member to request, and inspect, all data supporting the requested new or additional NERC-CIP specific Capital Costs. However, as initially applied, any Member, including those that may or may not have an interest in those costs, had the right under the Tariff to review the data, even those that may unduly benefit, in some manner, from the data review. As such, a change has been added to paragraph 20 to specify that only those PJM Members that are affected by the proposed cost recovery may request, and inspect, the data supporting the requested new or additional NERC-CIP specific Capital Costs.

III. Stakeholder Support

On May 16, 2013, the Members Committee met and endorsed the proposed revisions by acclamation with no objections and one abstention.

⁸ See, *PJM Interconnection, L.L.C.*, Docket No. ER11-4402-000, Transmittal Letter at p. 10.

IV. Effective Date

Consistent with the Commission's notice requirements, PJM requests an effective date of September 9, 2013, which is at least 60 days from the date of this filing.

V. Documents Submitted

Along with this transmittal letter, PJM submits electronic versions of the revisions to the Tariff in both marked (showing the changes) and clean forms.

VI. Correspondence and Communication

The following individuals are designated for inclusion on the official service list in this proceeding and for receipt of any communication regarding this filing:

Robert V. Eckenrod
Senior Counsel
PJM Interconnection, L.L.C.
955 Jefferson Avenue
Norristown, Pennsylvania 19403-2497
(610) 666-3184
eckenr@pjm.com

Craig Glazer
Vice President – Federal Government Policy
PJM Interconnection, L.L.C.
1200 G Street, N.W. Suite 600
Washington, D.C. 20005
(202) 423-4743
glazec@pjm.com

VII. Service

PJM has served a copy of this filing on all PJM Members and on all state utility regulatory commissions in the PJM Region by posting this filing electronically. Electronic service is permitted as of November 3, 2008, under the Commission's regulations⁹ pursuant to Order No. 714¹⁰ and the Commission's Notice of Effectiveness of Regulations issued on October 28, 2008, in Docket No. RM01-5-000. In compliance with those regulations, PJM will post a copy of this filing to the FERC filings section of its internet site, located at the following link: <http://www.pjm.com/documents/ferc-manuals/ferc-filings.aspx> with a specific link to the newly filed document, and will send an e-mail on the same date as this filing to all PJM Members and all state utility regulatory commissions in the PJM Region¹¹ alerting them that this filing has been made by PJM today and available by following such link. If the document is not immediately available by using the referenced link, the document will be available through the referenced link within 24 hours of the filing. Also, a copy of this filing will be available on the Commission's eLibrary website located at the following link: <http://www.ferc.gov/docs-filing/elibrary.asp> in accordance with the Commission's regulations and Order No. 714.

⁹ See, 18 C.F.R. §§ 35.2, 154.2, 154.208 and 341.2.

¹⁰ *Electronic Tariff Filings*, Order No. 714, 124 FERC ¶ 61,270

¹¹ PJM already maintains updates and regularly uses e-mail lists for all PJM Members and affected commissions.

Honorable Kimberly D. Bose
July 9, 2013
Page 9

Respectfully submitted,



Craig Glazer
Vice President – Federal Government Policy
PJM Interconnection, L.L.C.
1200 G Street, N.W. Suite 600
Washington, D.C. 20005
(202) 423-4743
glazec@pjm.com

Robert V. Eckenrod
Senior Counsel
PJM Interconnection, L.L.C.
955 Jefferson Avenue
Norristown, Pennsylvania 19403-2497
(610) 666-3184
eckenr@pjm.com

Attachment A

Revisions to the
PJM Open Access Transmission Tariff

(Marked / Redline Format)

SCHEDULE 6A

Black Start Service

References to section numbers in this Schedule 6A refer to sections of this Schedule 6A, unless otherwise specified.

To ensure the reliable restoration following a shut down of the PJM transmission system, Black Start Service is necessary to facilitate the goal of complete system restoration. Black Start Service enables the Transmission Provider ~~and Transmission Owners~~ to designate specific generators called Black Start Units whose location and capabilities are required to re-energize the transmission system following a system-wide blackout. The Transmission Provider shall administer the provision of Black Start Service. PJMSettlement shall be the Counterparty to the purchases and sales of Black Start Service.

TRANSMISSION CUSTOMERS

1. All Transmission Customers and Network Customers must obtain Black Start Service through the Transmission Provider, with PJMSettlement as the Counterparty, pursuant to this Schedule 6A.

PROVISION OF BLACK START SERVICE

2. A Black Start Unit is a generating unit that has equipment enabling it to start without an outside electrical supply or a generating unit with a high operating factor (subject to Transmission Provider concurrence) with the demonstrated ability to automatically remain operating, at reduced levels, when disconnected from the grid. A Black Start Unit shall be considered capable of providing Black Start Service only when it meets the criteria set forth in the PJM manuals. For the purposes of this Schedule 6A, the expected life of the Black Start Unit shall take into consideration expectations regarding both the enabling equipment and the generation unit itself.

3. A Black Start Plant is a generating plant that includes one or more Black Start Units. A generating plant with Black Start Units electrically separated at different voltage levels will be considered multiple Black Start Plants.

4. The Transmission Provider, ~~in conjunction with the Transmission Owners, are~~ is responsible for developing a coordinated and efficient system restoration plan that identifies all of the locations where Black Start Units are needed. The PJM Manuals shall set forth the criteria and process for selecting or identifying the Black Start Units necessary to commit to providing Black Start Service at the identified locations. ~~No more than three Black Start Units at a Black Start Plant will be eligible for compensation under this Schedule 6A, unless specifically approved by the Transmission Provider as an exception.~~ No Black Start Unit shall be eligible to recover the costs of providing Black Start Service in the PJM Region unless it agrees to provide such service for a term of commitment established under section 5 or 6 below.

5. Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to forego any recovery of new or additional Black Start Capital Costs shall

commit to provide Black Start Service from such Black Start Units for an initial term of no less than two years and authorize the Transmission Provider to resell Black Start Service from its Black Start Units. The term commitment shall continue to extend until the Black Start Unit owner, ~~or the Transmission Owner, with the consent of the Transmission Provider,~~ or the Transmission Provider, ~~with the consent of the Transmission Owner,~~ provides written, one-year advance notice of its intention to terminate the commitment or the commitment is involuntarily terminated pursuant to Section 15 of this Schedule 6A.

6. Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to recover new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for a term based upon the age of the Black Start Unit or the longest expected life of the Incremental Black Start Capital Cost, as set forth in the applicable CRF Tables in Paragraph 18. For those Black Start Units that elect to recover new or additional Black Start Capital Costs in addition to a prior, FERC-approved cost recovery rate, the applicable commitment period shall be the longer of the FERC-approved recovery period or the applicable term of commitment as set forth in the CRF Tables in Paragraph 18. ~~Either the Transmission Provider, with the consent of the Transmission Owner, or the Transmission Owner, with the consent of the Transmission Provider,~~ may terminate the commitment with one year advance notice of its intention to the Black Start Unit owner, but ~~the Transmission Owner shall reimburse~~ the Black Start Unit owner shall be eligible to recover for any amount of unrecovered Fixed Black Start Service Costs over a period not to exceed five years. A Black Start Unit owner may terminate the provision of Black Start Service with one year advance notice and consent of the Transmission Provider (or its commitment period may be involuntarily terminated pursuant to the section 15 below). Such Black Start Unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(i)) in excess of the amount that would have been recovered pursuant to section 18 during the same period. At the conclusion of the term of commitment established under this section 6, a Black Start Unit shall commence a new term of commitment under either section 5 or 6, as applicable.

6A. In the event that a Black Start Unit fails to fulfill its commitment established under section 5 to provide Black Start Service, receipt of any Black Start Service revenues associated with the non-performing Black Start Unit shall cease and, for the period of the unit's non-performance, the Black Start Unit owner shall forfeit the Black Start Service revenues associated with the non-performing Black Start Unit that it received or would have received had the Black Start Unit performed, not to exceed revenues for a maximum of one year.

In the event that a Black Start Unit fails to fulfill its commitment established under section 6 above, such unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(i)) in excess of the amount that would have been recovered pursuant to section 18 during the same period, but such unit remains eligible to establish a new commitment under section 5 or 6.

Performance Standards and Outage Restrictions

7. In addition to the performance capabilities set forth in the PJM Manuals, Black Start Units must have the capabilities listed below. These capabilities must be demonstrated in accordance with the criteria set forth in the PJM manuals and will remain in effect for the duration of the commitment to provide Black Start Service.
 - a. A Black Start Unit must be able to close its output circuit breaker to a dead (de-energized) bus within ~~90 minutes~~the time specified in the PJM Manuals~~of a request from the Transmission Owner or the Transmission Provider.~~
 - b. A Black Start Unit must be capable of maintaining frequency and voltage under varying load.
 - c. A Black Start Unit must be able to maintain rated output for a period of time identified by each Transmission Owner's system restoration requirements, in conjunction with the Transmission Provider.
8. Each owner of Black Start Units or Black Start Plants must maintain procedures for the start-up of the Black Start Units.
9. If a Black Start Unit is a generating unit with a high operating factor (subject to Transmission Provider concurrence) with the ability to automatically remain operating at reduced levels when disconnected from the grid, this ability must be demonstrated in accordance with the criteria set forth in the PJM manuals.
10. No more than one Black Start Unit at a Black Start Plant may be subject to planned maintenance at any one time. This restriction excludes outages on common plant equipment that may make all units unavailable. A Black Start Unit not currently designated as critical and on the same voltage level may be substituted for a Black Start Unit that is subject to a planned outage to permit a concurrent planned outage of another critical Black Start Unit at the Black Start Plant to begin. The Black Start Unit used as a substitute must have had a valid annual test within the previous 12 months.
11. Concurrent planned outages at multiple Black Start Plants within a zone may be restricted based on Transmission Owner requirements for Black Start Service availability. Such restrictions must be predefined and approved by Transmission Provider in accordance with the PJM manuals.

Testing

12. To verify that they can be started and operated without being connected to the Transmission System, Black Start Units designated as critical shall be tested annually in accordance with the PJM manuals. The Black Start Unit owner shall determine the time of the annual test.

13. Compensation for energy output delivered to the Transmission System during the annual test shall be provided for the Black Start Unit's minimum run time at the higher of the unit's cost-capped offer or real-time Locational Marginal Price plus start-up and no-load costs for up to two start attempts, if necessary. For Black Start Units that are generating units with a high operating factor (subject to Transmission Provider's concurrence) with the ability to automatically remain operating at reduced levels when disconnected from the grid, an opportunity cost will be provided to compensate the unit for lost revenues during testing.

14. To receive Black Start Service revenues, a Black Start Unit must have a successful annual test on record with the Transmission Provider within the preceding 13 months.

15. If a Black Start Unit fails the annual test, the unit may be re-tested within a ten-day period without financial penalty. If the Black Start Unit does not successfully re-test within that ten-day period, monthly Black Start Service revenues will be forfeited by that unit from the time of the first unsuccessful test until such time as the unit passes an annual test. If the Black Start Unit owner determines not to make the necessary repairs to enable the Black Start Unit to pass the annual test, the Black Start Unit owner will have failed to fulfill its commitment pursuant to section 5 or section 6, whichever is applicable, of this Schedule 6A and will be subject to the additional forfeiture of revenues set forth in section 6A.

Revenue Requirements

16. ~~A Black Start Unit Owner's~~ The annual Black Start Service revenue requirement shall be the sum of the annual Black Start Service revenue requirements for each generator that is designated as providing Black Start Service and has provided the Transmission Provider with a calculation of its annual Black Start Service revenue requirements. A separate line item shall appear on the participants' Transmission Provider bill for Black Start Service charges and credits.

17. Black Start Service revenue requirements for each Black Start Unit shall be based, at the election of the owner, on either (i) a FERC-approved rate for the recovery of the cost of providing such service for the entire duration of the commitment term set forth in either section 5 or 6, as applicable, or (ii) the formula rates set forth in section 18 of this Schedule 6A for the commitment term set forth in Paragraph 5 or 6 as applicable. Each generator's Black Start Service revenue requirements shall be an annual calculation. Requests for Black Start Service revenue requirements and for changes to the Black Start Service revenue requirements must be submitted to the Market Monitoring Unit for review and analysis, with supporting data and documentation, pursuant to section III of Attachment M – Appendix and the PJM Manuals, with a copy to the Office of the Interconnection, by no later than May 3 of each year. The Market Monitoring Unit and the Black Start Unit owner shall attempt to come to agreement on the level of each component included in the Black Start Service revenue requirements by no later than May 14 of each year. By no later than May 21 of each year, the Black Start Unit owner shall notify the Office of the Interconnection and the Market Monitoring Unit in writing whether it agrees or disagrees with the Market Monitoring Unit's determination of the level of each component included in the Black Start Service revenue requirements. The Black Start Unit owner may also submit Black Start Service revenue requirements that it chooses to the Office of

the Interconnection by no later than May 21 of each year, provided that (i) it has participated in good faith with the process described in this section and in section III of Attachment M - Appendix, (ii) the Black Start Service revenue requirements are no higher than the level defined in any agreement reached by the Black Start Unit owner and the Market Monitoring Unit that resulted from the foregoing process, and (iii) the Black Start Service revenue requirements are accepted by the Office of the Interconnection subject to the criteria set forth in the Tariff and PJM Manuals.

The Office of the Interconnection shall determine whether to accept the values submitted by the Black Start Unit owner subject to the requirements of the Tariff and the PJM Manuals by no later than May 27. If the Office of the Interconnection does not accept the values submitted by the Black Start Unit owner in such case, the Black Start Unit owner may file its proposed values with the Commission for approval. Pursuant to section III of Attachment M - Appendix, if the Office of the Interconnection accepts the Black Start Service revenue requirements submitted by the Black Start Unit owner in such case, the Market Monitoring Unit may petition the Commission for an order that would require the Black Start Unit owner to utilize the values determined by the Market Monitoring Unit or the Office of the Interconnection or such other values as determined by the Commission. The annual calculation of Black Start Service revenue requirements shall become effective on June 1 of each year, except that no change to a Black Start Service revenue requirement shall become effective until the existing revenue requirement has been effective for at least twelve months. Notwithstanding the foregoing, the deadlines set forth in this section 17 shall not apply to a Black Start Unit owner's election to select a new method of recovery for its Fixed BSSC.

18. The formula for calculating a generator's annual Black Start Service revenue requirement is:

$$\{(\text{Fixed BSSC}) + (\text{Variable BSSC}) + (\text{Training Costs}) + (\text{Fuel Storage Costs})\} * (1 + Z)$$

For units that have the demonstrated ability to operate at reduced levels when automatically disconnected from the grid, the formula is revised to:

$$(\text{Training Costs}) * (1 + Z)$$

Where:

Fixed BSSC

Black Start Units with a commitment established under Paragraph 5 shall calculate Fixed BSSC or "Fixed Black Start Service Costs" in accordance with the following Base Formula Rate:

Base Formula Rate:

$$\text{Net CONE} * \text{Black Start Unit Capacity} * X$$

Where:

“Net CONE” is the then current installed capacity (“ICAP”) net Cost of New Entry (expressed in \$/MW year) for the CONE Area where the Black Start Unit is located.

“Black Start Unit Capacity” is the Black Start Unit’s installed capacity, expressed in MW.

“X” is the Black Start Service allocation factor unless a higher or lower value is supported by the documentation of the actual costs of providing Black Start Service. For such units qualifying as Black Start Units on the basis of demonstrated ability to operate at reduced levels when automatically disconnected from the grid, X shall be zero. For Black Start Units with a commitment established under section 5, X shall be .01 for Hydro units, .02 for CT units.

Black Start Units with a commitment established under Paragraph 6 above shall calculate Fixed BSSC or “Fixed Black Start Service Costs” in accordance with one of the following formulas, as applicable:

Capital Cost Recovery Rate – NERC-CIP Specific Recovery

$$(\text{Net Cone} * \text{Black Start NERC-CIP Unit Capacity} * X) + (\text{Incremental Black Start NERC-CIP Capital Costs} * \text{CRF})$$

Where:

“Net Cone” is the then current installed capacity (“ICAP”) net Cost of New Entry (expressed in \$/MW year) for the CONE are where the Black Start Unit is located.

“Black Start NERC-CIP Unit Capacity” is the Black Start Unit’s installed capacity, expressed in MW, but, for purposes of this calculation, capped at 100 MW for Hydro units, or 50 MW for CT units.

“Incremental Black Start NERC-CIP Capital Cost” are those capital costs documented by the owner or accepted by the Commission for the incremental equipment solely necessary to enable a Black Start Unit to maintain compliance with mandatory Critical Infrastructure Protection Reliability Standards (as approved by the Commission and administered by the applicable Electric Reliability Organization).

“CRF” or “Capital Recovery Factor” is equal to the levelized CRF as set forth in the applicable CRF Table set forth below.

A Black Start Unit may elect to terminate forward cost recovery under this Capital Cost Recovery Rate – NERC-CIP Specific Recovery at any time and seek cost recovery under the Capital Cost Recovery Rate, pursuant to the terms and conditions set forth below.

Capital Cost Recovery Rate

(FERC-approved rate) + (Incremental Black Start Capital Costs * CRF)

Where:

“FERC-approved rate” is the Black Start Unit’s current FERC-approved recovery of costs to provide Black Start Service, if applicable. To the extent that a Black Start Unit owner is currently recovering black start costs pursuant to a FERC-approved rate, that cost recovery will be included as a formulaic component for calculating the Black Start Unit’s annual revenue requirement pursuant to this paragraph 18. However, under no circumstances will PJM or the Black Start Unit owner restructure or modify that existing FERC-approved rate without FERC approval.

“Incremental Black Start Capital Costs” are the new or additional capital costs documented by the owner or accepted by the Commission for the incremental equipment solely necessary to enable a unit to provide Black Start Service in addition to whatever other product or services such unit may provide. Such costs shall include those incurred by a Black Start Unit owner in order to meet NERC Reliability Standards that apply to Black Start Units solely on the basis of the provision of Black Start Service by such unit. However, Incremental Black Start Capital Costs shall not include any capital costs that the Black Start Unit owner is recovering for that unit pursuant to a FERC-approved recovery rate.

“CRF” or “Capital Recovery Factor “ is equal to the Llevelized CRF based on the age of the Black Start Unit, which is modified to provide Black Start Service, as present in the CRF Table below:

Age of Black Start Unit	Term of Black Start Commitment	Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16+	5	0.363

Or:

Optionally, a Black Start Unit owner may elect to apply an alternative Capital Recovery Factor, in lieu of the age-based CRF Table listed above, which is based upon to the expected Capital Improvement Lifespan of the new or additional capital

improvements (as determined by the applicable depreciation period of the capital improvement, as published from time to time by the US Internal Revenue Service). The Applicable Recovery Period and the term of Black Start Service Commitment shall be the same and determined by the expected Capital Improvement Lifespan. The applicable term of Black Start Service commitment shall be equal to the Capital Improvement Lifespan. In the event that the Black Start Unit seeks recovery of capital improvements that are included in more than one category of Capital Improvement Lifespan (as set forth below), its aApplicable Recovery Period and term of commitment to provide black start service for such Black Start Unit shall be the longest expected life of those new or additional capital improvements.

<u>Capital Improvement Lifespan (Years)</u>		<u>Levelized CRF</u>
<u>16-20</u>		<u>0.125</u>
<u>11-15</u>		<u>0.146</u>
<u>6-10</u>		<u>0.198</u>
<u>1-5</u>		<u>0.363</u>
<u>Capital Improvement Lifespan (years)</u>	<u>Applicable Recovery Period/Term of Commitment (years)</u>	<u>Levelized CRF</u>
<u>16-20</u>	<u>20</u>	<u>0.125</u>
<u>11-15</u>	<u>15</u>	<u>0.146</u>
<u>6-10</u>	<u>10</u>	<u>0.198</u>
<u>1-5</u>	<u>5</u>	<u>0.363</u>

In those circumstances where a Black Start Unit owner has elected to recover Incremental Black Start Capital Costs, in addition to a FERC-approved recovery rate, its applicable term of commitment shall be the greater of: (i) the FERC-approved recovery period, or; (ii) the applicable term of commitment as established by the CRF Tables above.

After a Black Start Unit has recovered its allowable Incremental Black Start Capital Costs or Incremental Black Start NERC-CIP Capital Costs, as provided by the applicable Capital Cost Recovery Rate, and has satisfied its applicable commitment period required under Paragraph 6, the Black Start Unit shall be committed to providing black start in accordance with Paragraph 5 of this Schedule 6A and calculate its Fixed BSSC in accordance with the Base Formula Rate.

Variable BSSC

All Black Start Units shall calculate Variable BSSC or “Variable Black Start Service Costs” in accordance with the following formula:

$$\text{Black Start Unit O\&M} * Y$$

Where:

“Black Start Unit O&M” are the operations and maintenance costs attributable to supporting Black Start Service and must equal the annual variable O&M outlined in the PJM Cost Development Guidelines set forth in the PJM Manuals. Such costs shall include those incurred by a Black Start Owner in order to meet NERC Reliability Standards that apply to the Black Start Unit solely on the basis of the provision of Black Start Service by unit.

“Y” is 0.01, unless a higher or lower value is supported by the documentation of costs. If a value of Y is submitted for this cost, a (1-Y) factor must be applied to the Black Start Unit’s O&M costs on the unit’s cost-based energy schedule, calculated based on the Cost Development Guidelines in the PJM Manuals.

For units qualifying as Black Start Units on the basis of a demonstrated ability to operate at reduced levels when automatically disconnected from the grid, there are no variable costs associated with providing Black Start Service and the value for Variable BSSC shall be zero.

Training Costs:

All Black Start Units shall calculate Training Costs in accordance with the following formula:

50 staff hours/year/plant*75/hour

Fuel Storage Costs:

Black Start Units that cannot use oil for fuel shall calculate Fuel Storage Costs or “FSC” as zero. Black Start Units that can use oil for fuel shall calculate Fuel Storage Costs in accordance with the following formula:

$$\frac{\{MTSL + [(\# \text{ Run Hours}) * (\text{Fuel Burn Rate})]\}}{(12 \text{ Month Forward Strip} + \text{Basis}) * (\text{Bond Rate})} *$$

Where:

Run Hours are the actual number of hours a Transmission Provider requires a Black Start Unit to run. Run Hours shall be at least 16 hours or as defined by the Transmission Owner restoration plan, whichever is less.

“Fuel Burn Rate” is actual fuel burn rate for the Black Start Unit.

“12-Month Forward Strip” is the average of forward prices for the fuel burned in the Black Start Unit traded the first business day on or following May 1.

“Basis” is the transportation costs from the location referenced in the forward price data to the Black Start Unit plus any variable taxes.

“Bond rate” is the value determined with reference to the Moody's Utility Index for bonds rated Baa1 reported the first business day on or following May 1.

“MTSL” is the “minimum tank suction level” and shall apply where no direct current pumps are available for the Black Start Unit.

For units qualifying as Black Start Units on the basis of a demonstrated ability to operate at reduced levels when automatically disconnected from the grid, there are no associated fuel storage costs and the value for FSC shall be zero.

Z

Z shall be an incentive factor solely for Black Start Units with a commitment established under section 5 above and shall be ten percent. For those Black Start Units that elect to recover new or additional Black Start Capital Costs under section 6 above, the incentive factor, Z, shall be equal to zero.

At least every two years, PJM shall review the formula and its costs components set forth in this section, and report on the results of that review to stakeholders.

19. Transmission Provider or its agent shall have the right to independently audit the accounts and records of each Black Start Unit that is receiving payments for providing Black Start Service.

20. PJM shall notify its Members when a Black Start Unit seeks to recover new or additional Black Start NERC-CIP Capital Costs under Paragraph 18 no later than thirty (30) days prior to the effective date of the recovery. At the written request of ~~any~~ PJM Member, made simultaneously to the Market Monitoring Unit and PJM, with notice to the Black Start Unit owner, the Market Monitoring Unit shall make available to the affected PJM Member for inspection at the offices of the Market Monitoring Unit, all data supporting the requested new or additional NERC-CIP specific Capital Costs. The Black Start Unit owner may elect to attend this review. In all cases, the supporting data is to be held confidential and may not be distributed.

21. The Market Monitoring Unit shall include a Black Start Service summary in its annual State of the Market report which will set forth a descriptive summary of the new or additional Black Start NERC-CIP Capital Costs requested by Black Start Units, and include a list of the types of capital costs requested and the overall cost of such capital improvements on an aggregate basis such that no data is attributable to an individual Black Start Unit.

Credits

22. Monthly credits are provided to generators that submit to the Transmission Provider their annual revenue requirements established pursuant to section 17 of this Schedule 6A. The generator's monthly credit is equal to 1/12 of its annual Black Start Service revenue requirement for eligible critical Black Start Units.

23. Revenue requirements for jointly owned Black Start Units will be allocated to the owners based on ownership percentage.

24. Transmission Provider shall not compensate generators for Black Start Service unless they meet the Transmission Provider criteria for Black Start Service and the criteria for Black Start Service in the Applicable Standards and provide Transmission Provider with all necessary data in accordance with this Schedule 6A and the PJM manuals.

Charges

25. Zonal rates will be based on Black Start Service capability or share of generation units ~~nominated by each transmission zone~~ designated by the Transmission Provider and allocated to network service customers and point-to-point reservations.

26. Revenue requirements for Black Start Units ~~nominated by a Transmission Owner~~ designated by the Transmission Provider as critical (regardless of zonal location) will be allocated to the ~~nominating~~ receiving Transmission Owner's zone. Black Start Units that are shared and designated to serve multiple zones will have their annual revenues allocated by Transmission Owner designated critical load percentage.

27. Purchasers of Black Start Service shall be charged for such service in accordance with the following formulae.

Monthly Charge for a purchaser receiving Network Integration Transmission Service or Point-to-Point Transmission Service to serve Non-Zone Load = Allocation Factor * Total Generation Owner Monthly Black Start Service Revenue Requirement

Monthly Charge for a purchaser receiving Network Integration Transmission Service or Point-to-Point Transmission Service to serve Zone Load = Allocation Factor * Zonal Generation Owner Monthly Black Start Service Revenue Requirement * Adjustment Factor

Where:

Purchaser serving Non-Zone Load is a Network Customer serving Non-Zone Network Load or a Transmission Customer where the Point of Delivery is at the boundary of the PJM Region.

Zonal Generation Owner Monthly Black Start Service Revenue Requirement is the sum of the monthly share of Black Start Service revenue requirements for each generator nominated by the Transmission Owners in that zone.

Total Generation Owner Monthly Black Start Service Revenue Requirement is the sum of the Zonal Generation Owner Monthly Black Start Service Revenue Requirements for all Zones in the PJM Region.

Allocation Factor is the monthly transmission use of each Network Customer or Transmission Customer per Zone or Non-Zone, as applicable, on a megawatt basis divided by the total transmission use in the Zone or in the PJM Region, as applicable, on a megawatt basis.

For Network Customers, monthly transmission use on a megawatt basis is the sum of a Network Customer's daily values of DCPZ or DCPNZ (as those terms are defined in Section 34.1) as applicable, for all days of the month.

For Transmission Customers, monthly transmission use on a megawatt basis is the sum of the Transmission Customer's hourly amounts of Reserved Capacity for each day of the month (not curtailed by PJM) divided by the number of hours in the day.

Adjustment Factor is determined as the sum of the total monthly transmission use in the PJM Region on a megawatt basis, exclusive of such use by Network Customers and Transmission Customers serving Non-Zone Load, divided by the total monthly transmission use in the PJM Region on a megawatt basis.

In the event that a single customer is serving load in more than one Zone, or serving Non-Zone Load as well as load in one or more Zones, or is both a Network Customer and a Transmission Customer, the Monthly Charge for such a customer shall be the sum of the Monthly Charges determined by applying the appropriate formulae set forth in this Schedule 6A.

Attachment B

Revisions to the
PJM Open Access Transmission Tariff

(Clean Format)

SCHEDULE 6A

Black Start Service

References to section numbers in this Schedule 6A refer to sections of this Schedule 6A, unless otherwise specified.

To ensure the reliable restoration following a shut down of the PJM transmission system, Black Start Service is necessary to facilitate the goal of complete system restoration. Black Start Service enables the Transmission Provider to designate specific generators called Black Start Units whose location and capabilities are required to re-energize the transmission system following a system-wide blackout. The Transmission Provider shall administer the provision of Black Start Service. PJMSettlement shall be the Counterparty to the purchases and sales of Black Start Service.

TRANSMISSION CUSTOMERS

1. All Transmission Customers and Network Customers must obtain Black Start Service through the Transmission Provider, with PJMSettlement as the Counterparty, pursuant to this Schedule 6A.

PROVISION OF BLACK START SERVICE

2. A Black Start Unit is a generating unit that has equipment enabling it to start without an outside electrical supply or a generating unit with a high operating factor (subject to Transmission Provider concurrence) with the demonstrated ability to automatically remain operating, at reduced levels, when disconnected from the grid. A Black Start Unit shall be considered capable of providing Black Start Service only when it meets the criteria set forth in the PJM manuals. For the purposes of this Schedule 6A, the expected life of the Black Start Unit shall take into consideration expectations regarding both the enabling equipment and the generation unit itself.

3. A Black Start Plant is a generating plant that includes one or more Black Start Units. A generating plant with Black Start Units electrically separated at different voltage levels will be considered multiple Black Start Plants.

4. The Transmission Provider is responsible for developing a coordinated and efficient system restoration plan that identifies all of the locations where Black Start Units are needed. The PJM Manuals shall set forth the criteria and process for selecting or identifying the Black Start Units necessary to commit to providing Black Start Service at the identified locations. No Black Start Unit shall be eligible to recover the costs of providing Black Start Service in the PJM Region unless it agrees to provide such service for a term of commitment established under section 5 or 6 below.

5. Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to forego any recovery of new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for an initial term of no less than two years and authorize the Transmission Provider to resell Black Start Service from its

Black Start Units. The term commitment shall continue to extend until the Black Start Unit owner or the Transmission Provider provides written, one-year advance notice of its intention to terminate the commitment or the commitment is involuntarily terminated pursuant to Section 15 of this Schedule 6A.

6. Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to recover new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for a term based upon the age of the Black Start Unit or the longest expected life of the Incremental Black Start Capital Cost, as set forth in the applicable CRF Tables in Paragraph 18. For those Black Start Units that elect to recover new or additional Black Start Capital Costs in addition to a prior, FERC-approved cost recovery rate, the applicable commitment period shall be the longer of the FERC-approved recovery period or the applicable term of commitment as set forth in the CRF Tables in Paragraph 18. The Transmission Provider may terminate the commitment with one year advance notice of its intention to the Black Start Unit owner, but the Black Start Unit owner shall be eligible to recover any amount of unrecovered Fixed Black Start Service Costs over a period not to exceed five years. A Black Start Unit owner may terminate the provision of Black Start Service with one year advance notice and consent of the Transmission Provider (or its commitment period may be involuntarily terminated pursuant to the section 15 below). Such Black Start Unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(i)) in excess of the amount that would have been recovered pursuant to section 18 during the same period. At the conclusion of the term of commitment established under this section 6, a Black Start Unit shall commence a new term of commitment under either section 5 or 6, as applicable.

6A. In the event that a Black Start Unit fails to fulfill its commitment established under section 5 to provide Black Start Service, receipt of any Black Start Service revenues associated with the non-performing Black Start Unit shall cease and, for the period of the unit's non-performance, the Black Start Unit owner shall forfeit the Black Start Service revenues associated with the non-performing Black Start Unit that it received or would have received had the Black Start Unit performed, not to exceed revenues for a maximum of one year.

In the event that a Black Start Unit fails to fulfill its commitment established under section 6 above, such unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(i)) in excess of the amount that would have been recovered pursuant to section 18 during the same period, but such unit remains eligible to establish a new commitment under section 5 or 6.

Performance Standards and Outage Restrictions

7. In addition to the performance capabilities set forth in the PJM Manuals, Black Start Units must have the capabilities listed below. These capabilities must be demonstrated in

accordance with the criteria set forth in the PJM manuals and will remain in effect for the duration of the commitment to provide Black Start Service.

- a. A Black Start Unit must be able to close its output circuit breaker to a dead (de-energized) bus within the time specified in the PJM Manuals.
 - b. A Black Start Unit must be capable of maintaining frequency and voltage under varying load.
 - c. A Black Start Unit must be able to maintain rated output for a period of time identified by each Transmission Owner's system restoration requirements, in conjunction with the Transmission Provider.
8. Each owner of Black Start Units or Black Start Plants must maintain procedures for the start-up of the Black Start Units.
9. If a Black Start Unit is a generating unit with a high operating factor (subject to Transmission Provider concurrence) with the ability to automatically remain operating at reduced levels when disconnected from the grid, this ability must be demonstrated in accordance with the criteria set forth in the PJM manuals.
10. No more than one Black Start Unit at a Black Start Plant may be subject to planned maintenance at any one time. This restriction excludes outages on common plant equipment that may make all units unavailable. A Black Start Unit not currently designated as critical and on the same voltage level may be substituted for a Black Start Unit that is subject to a planned outage to permit a concurrent planned outage of another critical Black Start Unit at the Black Start Plant to begin. The Black Start Unit used as a substitute must have had a valid annual test within the previous 12 months.
11. Concurrent planned outages at multiple Black Start Plants within a zone may be restricted based on Transmission Owner requirements for Black Start Service availability. Such restrictions must be predefined and approved by Transmission Provider in accordance with the PJM manuals.

Testing

12. To verify that they can be started and operated without being connected to the Transmission System, Black Start Units designated as critical shall be tested annually in accordance with the PJM manuals. The Black Start Unit owner shall determine the time of the annual test.
13. Compensation for energy output delivered to the Transmission System during the annual test shall be provided for the Black Start Unit's minimum run time at the higher of the unit's cost-capped offer or real-time Locational Marginal Price plus start-up and no-load costs for up to two start attempts, if necessary. For Black Start Units that are generating units with a high operating factor (subject to Transmission Provider's concurrence) with the ability to

automatically remain operating at reduced levels when disconnected from the grid, an opportunity cost will be provided to compensate the unit for lost revenues during testing.

14. To receive Black Start Service revenues, a Black Start Unit must have a successful annual test on record with the Transmission Provider within the preceding 13 months.

15. If a Black Start Unit fails the annual test, the unit may be re-tested within a ten-day period without financial penalty. If the Black Start Unit does not successfully re-test within that ten-day period, monthly Black Start Service revenues will be forfeited by that unit from the time of the first unsuccessful test until such time as the unit passes an annual test. If the Black Start Unit owner determines not to make the necessary repairs to enable the Black Start Unit to pass the annual test, the Black Start Unit owner will have failed to fulfill its commitment pursuant to section 5 or section 6, whichever is applicable, of this Schedule 6A and will be subject to the additional forfeiture of revenues set forth in section 6A.

Revenue Requirements

16. A Black Start Unit Owner's annual Black Start Service revenue requirement shall be the sum of the annual Black Start Service revenue requirements for each generator that is designated as providing Black Start Service and has provided the Transmission Provider with a calculation of its annual Black Start Service revenue requirements. A separate line item shall appear on the participants' Transmission Provider bill for Black Start Service charges and credits.

17. Black Start Service revenue requirements for each Black Start Unit shall be based, at the election of the owner, on either (i) a FERC-approved rate for the recovery of the cost of providing such service for the entire duration of the commitment term set forth in either section 5 or 6, as applicable, or (ii) the formula rates set forth in section 18 of this Schedule 6A for the commitment term set forth in Paragraph 5 or 6 as applicable. Each generator's Black Start Service revenue requirements shall be an annual calculation. Requests for Black Start Service revenue requirements and for changes to the Black Start Service revenue requirements must be submitted to the Market Monitoring Unit for review and analysis, with supporting data and documentation, pursuant to section III of Attachment M – Appendix and the PJM Manuals, with a copy to the Office of the Interconnection, by no later than May 3 of each year. The Market Monitoring Unit and the Black Start Unit owner shall attempt to come to agreement on the level of each component included in the Black Start Service revenue requirements by no later than May 14 of each year. By no later than May 21 of each year, the Black Start Unit owner shall notify the Office of the Interconnection and the Market Monitoring Unit in writing whether it agrees or disagrees with the Market Monitoring Unit's determination of the level of each component included in the Black Start Service revenue requirements. The Black Start Unit owner may also submit Black Start Service revenue requirements that it chooses to the Office of the Interconnection by no later than May 21 of each year, provided that (i) it has participated in good faith with the process described in this section and in section III of Attachment M - Appendix, (ii) the Black Start Service revenue requirements are no higher than the level defined in any agreement reached by the Black Start Unit owner and the Market Monitoring Unit that resulted from the foregoing process, and (iii) the Black Start Service revenue requirements are

accepted by the Office of the Interconnection subject to the criteria set forth in the Tariff and PJM Manuals.

The Office of the Interconnection shall determine whether to accept the values submitted by the Black Start Unit owner subject to the requirements of the Tariff and the PJM Manuals by no later than May 27. If the Office of the Interconnection does not accept the values submitted by the Black Start Unit owner in such case, the Black Start Unit owner may file its proposed values with the Commission for approval. Pursuant to section III of Attachment M - Appendix, if the Office of the Interconnection accepts the Black Start Service revenue requirements submitted by the Black Start Unit owner in such case, the Market Monitoring Unit may petition the Commission for an order that would require the Black Start Unit owner to utilize the values determined by the Market Monitoring Unit or the Office of the Interconnection or such other values as determined by the Commission. The annual calculation of Black Start Service revenue requirements shall become effective on June 1 of each year, except that no change to a Black Start Service revenue requirement shall become effective until the existing revenue requirement has been effective for at least twelve months. Notwithstanding the foregoing, the deadlines set forth in this section 17 shall not apply to a Black Start Unit owner's election to select a new method of recovery for its Fixed BSSC.

18. The formula for calculating a generator's annual Black Start Service revenue requirement is:

$$\{(\text{Fixed BSSC}) + (\text{Variable BSSC}) + (\text{Training Costs}) + (\text{Fuel Storage Costs})\} * (1 + Z)$$

For units that have the demonstrated ability to operate at reduced levels when automatically disconnected from the grid, the formula is revised to:

$$(\text{Training Costs}) * (1 + Z)$$

Where:

Fixed BSSC

Black Start Units with a commitment established under Paragraph 5 shall calculate Fixed BSSC or "Fixed Black Start Service Costs" in accordance with the following Base Formula Rate:

Base Formula Rate:

$$\text{Net CONE} * \text{Black Start Unit Capacity} * X$$

Where:

“Net CONE” is the then current installed capacity (“ICAP”) net Cost of New Entry (expressed in \$/MW year) for the CONE Area where the Black Start Unit is located.

“Black Start Unit Capacity” is the Black Start Unit’s installed capacity, expressed in MW.

“X” is the Black Start Service allocation factor unless a higher or lower value is supported by the documentation of the actual costs of providing Black Start Service. For such units qualifying as Black Start Units on the basis of demonstrated ability to operate at reduced levels when automatically disconnected from the grid, X shall be zero. For Black Start Units with a commitment established under section 5, X shall be .01 for Hydro units, .02 for CT units.

Black Start Units with a commitment established under Paragraph 6 above shall calculate Fixed BSSC or “Fixed Black Start Service Costs” in accordance with one of the following formulas, as applicable:

Capital Cost Recovery Rate – NERC-CIP Specific Recovery

$$(\text{Net Cone} * \text{Black Start NERC-CIP Unit Capacity} * X) + (\text{Incremental Black Start NERC-CIP Capital Costs} * \text{CRF})$$

Where:

“Net Cone” is the then current installed capacity (“ICAP”) net Cost of New Entry (expressed in \$/MW year) for the CONE are where the Black Start Unit is located.

“Black Start NERC-CIP Unit Capacity” is the Black Start Unit’s installed capacity, expressed in MW, but, for purposes of this calculation, capped at 100 MW for Hydro units, or 50 MW for CT units.

“Incremental Black Start NERC-CIP Capital Cost” are those capital costs documented by the owner or accepted by the Commission for the incremental equipment solely necessary to enable a Black Start Unit to maintain compliance with mandatory Critical Infrastructure Protection Reliability Standards (as approved by the Commission and administered by the applicable Electric Reliability Organization).

“CRF” or “Capital Recovery Factor” is equal to the levelized CRF as set forth in the applicable CRF Table set forth below.

A Black Start Unit may elect to terminate forward cost recovery under this Capital Cost Recovery Rate – NERC-CIP Specific Recovery at any time and seek cost recovery under the Capital Cost Recovery Rate, pursuant to the terms and conditions set forth below.

Capital Cost Recovery Rate

(FERC-approved rate) + (Incremental Black Start Capital Costs * CRF)

Where:

“FERC-approved rate” is the Black Start Unit’s current FERC-approved recovery of costs to provide Black Start Service, if applicable. To the extent that a Black Start Unit owner is currently recovering black start costs pursuant to a FERC-approved rate, that cost recovery will be included as a formulaic component for calculating the Black Start Unit’s annual revenue requirement pursuant to this paragraph 18. However, under no circumstances will PJM or the Black Start Unit owner restructure or modify that existing FERC-approved rate without FERC approval.

“Incremental Black Start Capital Costs” are the new or additional capital costs documented by the owner or accepted by the Commission for the incremental equipment solely necessary to enable a unit to provide Black Start Service in addition to whatever other product or services such unit may provide. Such costs shall include those incurred by a Black Start Unit owner in order to meet NERC Reliability Standards that apply to Black Start Units solely on the basis of the provision of Black Start Service by such unit. However, Incremental Black Start Capital Costs shall not include any capital costs that the Black Start Unit owner is recovering for that unit pursuant to a FERC-approved recovery rate.

“CRF” or “Capital Recovery Factor “ is equal to the Levelized CRF based on the age of the Black Start Unit, which is modified to provide Black Start Service, as present in the CRF Table below:

Age of Black Start Unit	Term of Black Start Commitment	Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16+	5	0.363

Or:

Optionally, a Black Start Unit owner may elect to apply an alternative Capital Recovery Factor, in lieu of the age-based CRF Table listed above, which is based upon to the expected Capital Improvement Lifespan of the new or additional capital improvements (as determined by the applicable depreciation period of the capital improvement, as published from time to time by the US Internal Revenue Service). The Applicable Recovery Period and the term of Black Start Service Commitment shall be the

same and determined by the expected Capital Improvement Lifespan. In the event that the Black Start Unit seeks recovery of capital improvements that are included in more than one category of Capital Improvement Lifespan (as set forth below), its Applicable Recovery Period and term of commitment to provide black start service for such Black Start Unit shall be the longest expected life of those new or additional capital improvements.

Capital Improvement Lifespan (years)	Applicable Recovery Period/Term of Commitment (years)	Levelized CRF
16-20	20	0.125
11-15	15	0.146
6-10	10	0.198
1-5	5	0.363

In those circumstances where a Black Start Unit owner has elected to recover Incremental Black Start Capital Costs, in addition to a FERC-approved recovery rate, its applicable term of commitment shall be the greater of: (i) the FERC-approved recovery period, or; (ii) the applicable term of commitment as established by the CRF Tables above.

After a Black Start Unit has recovered its allowable Incremental Black Start Capital Costs or Incremental Black Start NERC-CIP Capital Costs, as provided by the applicable Capital Cost Recovery Rate, and has satisfied its applicable commitment period required under Paragraph 6, the Black Start Unit shall be committed to providing black start in accordance with Paragraph 5 of this Schedule 6A and calculate its Fixed BSSC in accordance with the Base Formula Rate.

Variable BSSC

All Black Start Units shall calculate Variable BSSC or “Variable Black Start Service Costs” in accordance with the following formula:

$$\text{Black Start Unit O\&M} * Y$$

Where:

“Black Start Unit O&M” are the operations and maintenance costs attributable to supporting Black Start Service and must equal the annual variable O&M outlined in the PJM Cost Development Guidelines set forth in the PJM Manuals. Such costs shall include those incurred by a Black Start Owner in order to meet NERC Reliability Standards that apply to the Black Start Unit solely on the basis of the provision of Black Start Service by unit.

“Y” is 0.01, unless a higher or lower value is supported by the documentation of costs. If a value of Y is submitted for this cost, a (1-Y) factor must be applied to the Black Start Unit’s O&M costs on the unit’s cost-based energy schedule, calculated based on the Cost Development Guidelines in the PJM Manuals.

For units qualifying as Black Start Units on the basis of a demonstrated ability to operate at reduced levels when automatically disconnected from the grid, there are no variable costs associated with providing Black Start Service and the value for Variable BSSC shall be zero.

Training Costs:

All Black Start Units shall calculate Training Costs in accordance with the following formula:

50 staff hours/year/plant*75/hour

Fuel Storage Costs:

Black Start Units that cannot use oil for fuel shall calculate Fuel Storage Costs or “FSC” as zero. Black Start Units that can use oil for fuel shall calculate Fuel Storage Costs in accordance with the following formula:

$$\{ \text{MTSL} + [(\# \text{ Run Hours}) * (\text{Fuel Burn Rate})] \} * (\text{12 Month Forward Strip} + \text{Basis}) * (\text{Bond Rate})$$

Where:

Run Hours are the actual number of hours a Transmission Provider requires a Black Start Unit to run. Run Hours shall be at least 16 hours or as defined by the Transmission Owner restoration plan, whichever is less.

“Fuel Burn Rate” is actual fuel burn rate for the Black Start Unit.

“12-Month Forward Strip” is the average of forward prices for the fuel burned in the Black Start Unit traded the first business day on or following May 1.

“Basis” is the transportation costs from the location referenced in the forward price data to the Black Start Unit plus any variable taxes.

“Bond rate” is the value determined with reference to the Moody's Utility Index for bonds rated Baa1 reported the first business day on or following May 1.

“MTSL” is the “minimum tank suction level” and shall apply where no direct current pumps are available for the Black Start Unit.

For units qualifying as Black Start Units on the basis of a demonstrated ability to operate at reduced levels when automatically disconnected from the grid, there are no associated fuel storage costs and the value for FSC shall be zero.

Z

Z shall be an incentive factor solely for Black Start Units with a commitment established under section 5 above and shall be ten percent. For those Black Start Units that elect to recover new or additional Black Start Capital Costs under section 6 above, the incentive factor, Z, shall be equal to zero.

At least every two years, PJM shall review the formula and its costs components set forth in this section, and report on the results of that review to stakeholders.

19. Transmission Provider or its agent shall have the right to independently audit the accounts and records of each Black Start Unit that is receiving payments for providing Black Start Service.

20. PJM shall notify its Members when a Black Start Unit seeks to recover new or additional Black Start NERC-CIP Capital Costs under Paragraph 18 no later than thirty (30) days prior to the effective date of the recovery. At the written request of a PJM Member, made simultaneously to the Market Monitoring Unit and PJM, with notice to the Black Start Unit owner, the Market Monitoring Unit shall make available to the affected PJM Member for inspection at the offices of the Market Monitoring Unit, all data supporting the requested new or additional NERC-CIP specific Capital Costs. The Black Start Unit owner may elect to attend this review. In all cases, the supporting data is to be held confidential and may not be distributed.

21. The Market Monitoring Unit shall include a Black Start Service summary in its annual State of the Market report which will set forth a descriptive summary of the new or additional Black Start NERC-CIP Capital Costs requested by Black Start Units, and include a list of the types of capital costs requested and the overall cost of such capital improvements on an aggregate basis such that no data is attributable to an individual Black Start Unit.

Credits

22. Monthly credits are provided to generators that submit to the Transmission Provider their annual revenue requirements established pursuant to section 17 of this Schedule 6A. The generator's monthly credit is equal to 1/12 of its annual Black Start Service revenue requirement for eligible critical Black Start Units.

23. Revenue requirements for jointly owned Black Start Units will be allocated to the owners based on ownership percentage.

24. Transmission Provider shall not compensate generators for Black Start Service unless they meet the Transmission Provider criteria for Black Start Service and the criteria for Black

Start Service in the Applicable Standards and provide Transmission Provider with all necessary data in accordance with this Schedule 6A and the PJM manuals.

Charges

25. Zonal rates will be based on Black Start Service capability or share of generation units designated by the Transmission Provider and allocated to network service customers and point-to-point reservations.

26. Revenue requirements for Black Start Units designated by the Transmission Provider as critical (regardless of zonal location) will be allocated to the receiving Transmission Owner's zone. Black Start Units that are shared and designated to serve multiple zones will have their annual revenues allocated by Transmission Owner designated critical load percentage.

27. Purchasers of Black Start Service shall be charged for such service in accordance with the following formulae.

Monthly Charge for a purchaser receiving Network Integration Transmission Service or Point-to-Point Transmission Service to serve Non-Zone Load = Allocation Factor * Total Generation Owner Monthly Black Start Service Revenue Requirement

Monthly Charge for a purchaser receiving Network Integration Transmission Service or Point-to-Point Transmission Service to serve Zone Load = Allocation Factor * Zonal Generation Owner Monthly Black Start Service Revenue Requirement * Adjustment Factor

Where:

Purchaser serving Non-Zone Load is a Network Customer serving Non-Zone Network Load or a Transmission Customer where the Point of Delivery is at the boundary of the PJM Region.

Zonal Generation Owner Monthly Black Start Service Revenue Requirement is the sum of the monthly share of Black Start Service revenue requirements for each generator nominated by the Transmission Owners in that zone.

Total Generation Owner Monthly Black Start Service Revenue Requirement is the sum of the Zonal Generation Owner Monthly Black Start Service Revenue Requirements for all Zones in the PJM Region.

Allocation Factor is the monthly transmission use of each Network Customer or Transmission Customer per Zone or Non-Zone, as applicable, on a megawatt basis divided by the total transmission use in the Zone or in the PJM Region, as applicable, on a megawatt basis.

For Network Customers, monthly transmission use on a megawatt basis is the sum of a Network Customer's daily values of DCPZ or DCPNZ (as those terms are defined in Section 34.1) as applicable, for all days of the month.

For Transmission Customers, monthly transmission use on a megawatt basis is the sum of the Transmission Customer's hourly amounts of Reserved Capacity for each day of the month (not curtailed by PJM) divided by the number of hours in the day.

Adjustment Factor is determined as the sum of the total monthly transmission use in the PJM Region on a megawatt basis, exclusive of such use by Network Customers and Transmission Customers serving Non-Zone Load, divided by the total monthly transmission use in the PJM Region on a megawatt basis.

In the event that a single customer is serving load in more than one Zone, or serving Non-Zone Load as well as load in one or more Zones, or is both a Network Customer and a Transmission Customer, the Monthly Charge for such a customer shall be the sum of the Monthly Charges determined by applying the appropriate formulae set forth in this Schedule 6A.